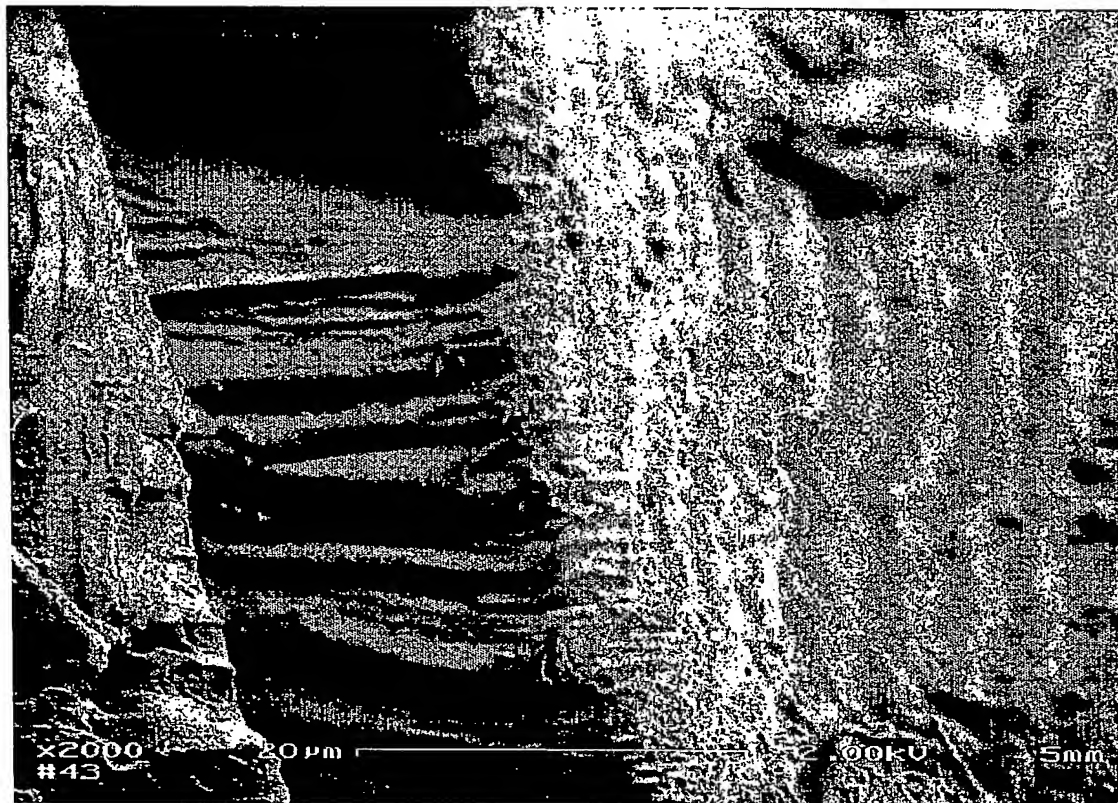


Figure 1



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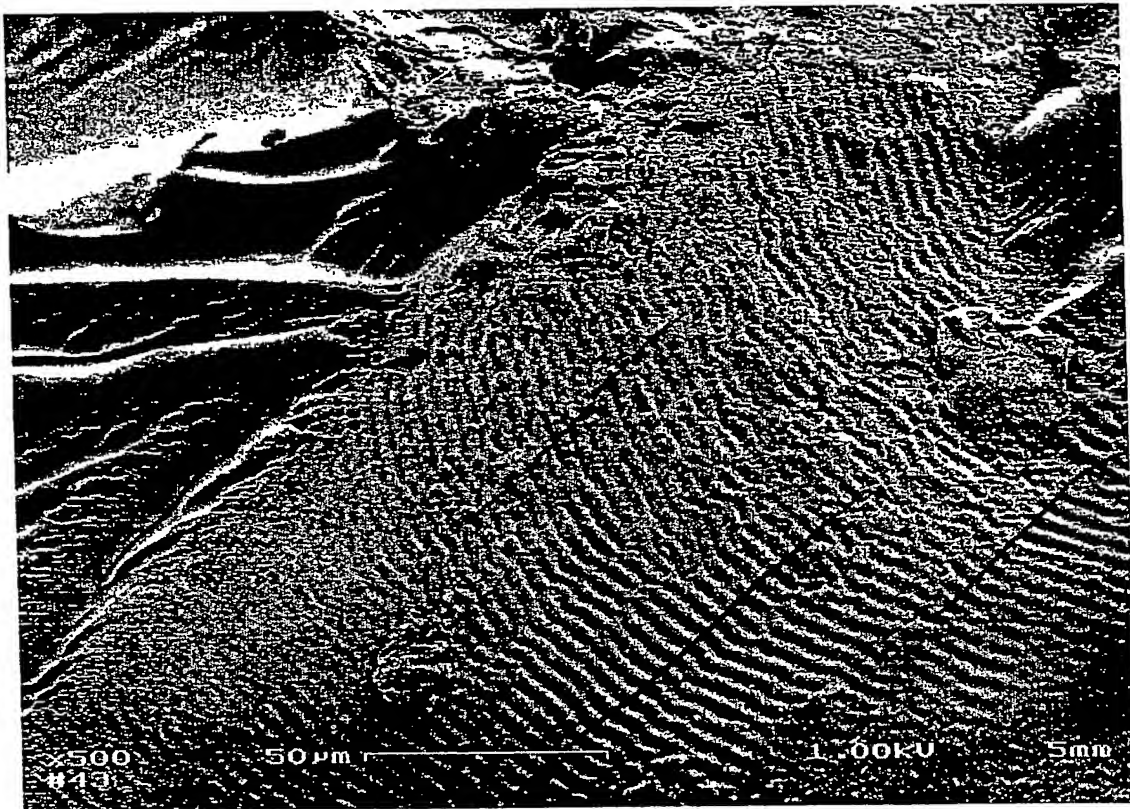
WO 2004/041845

PCT/US2003/034684

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REC'D PCT/PTO 29 APR 2005

Figure 2



10/533611

WO 2004/041845

Rec'd PCT/PTO PCT/US 2004/034684 29 APR 2005

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Figure 3

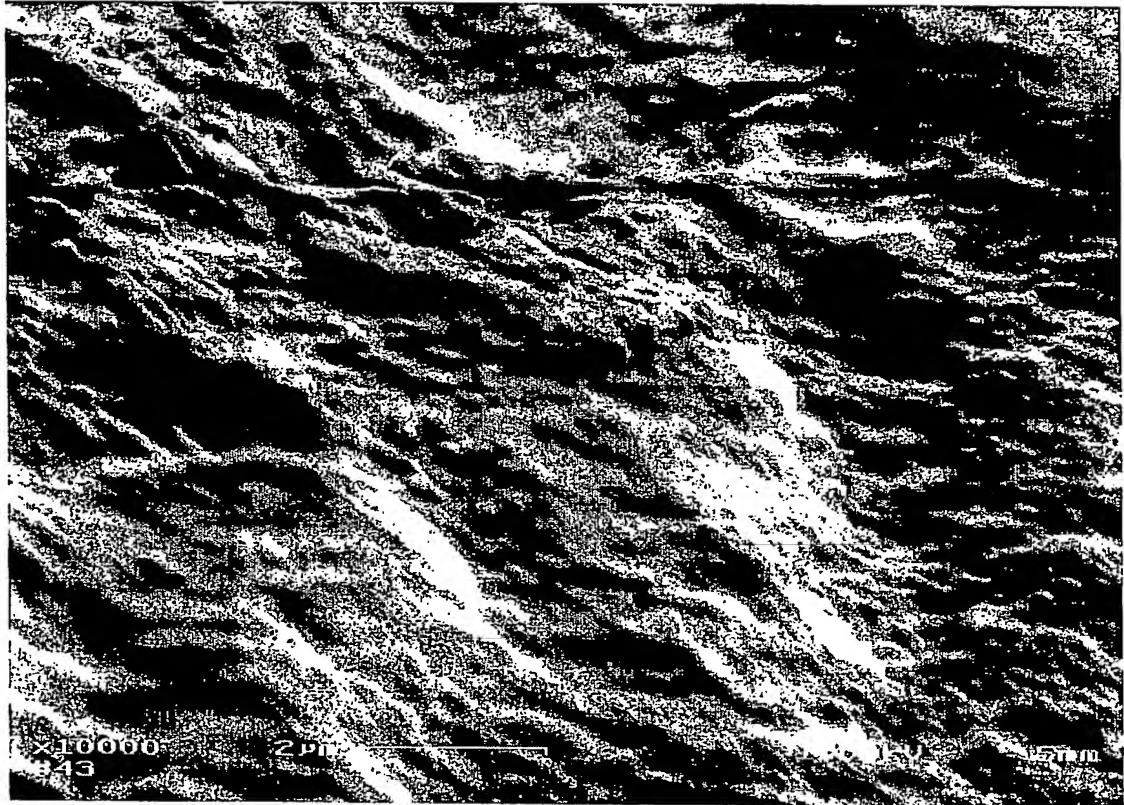


Figure 4

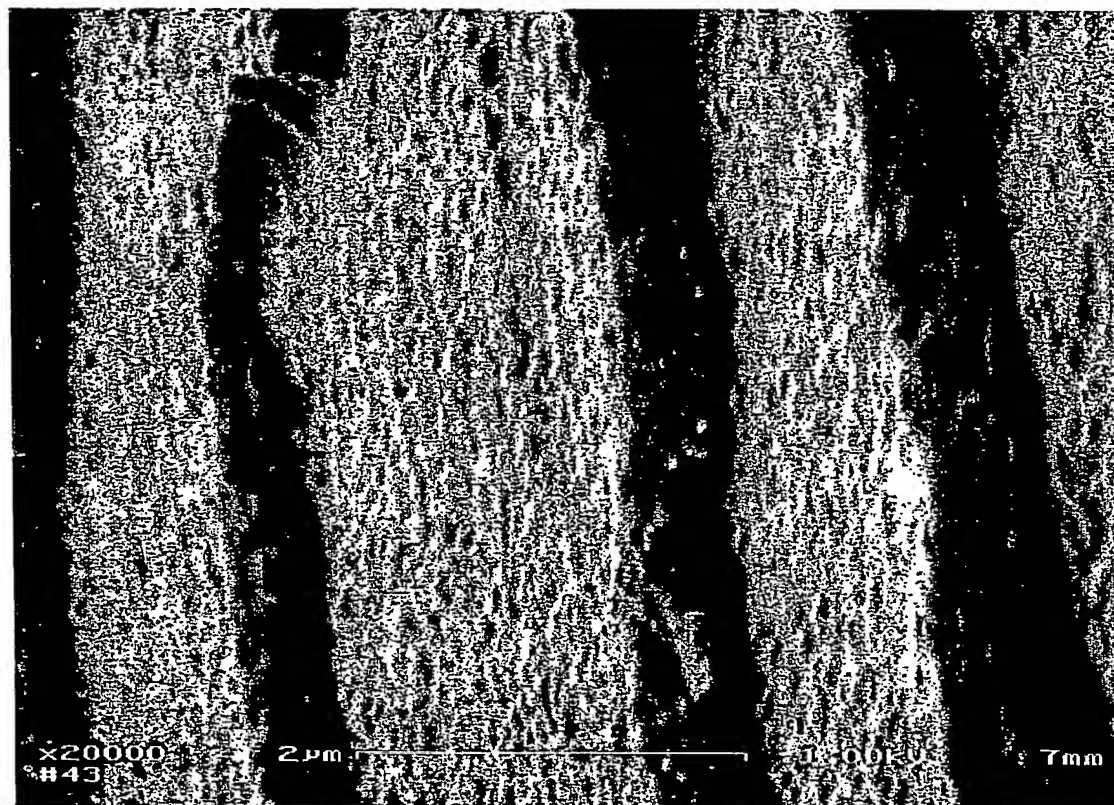


Figure 5

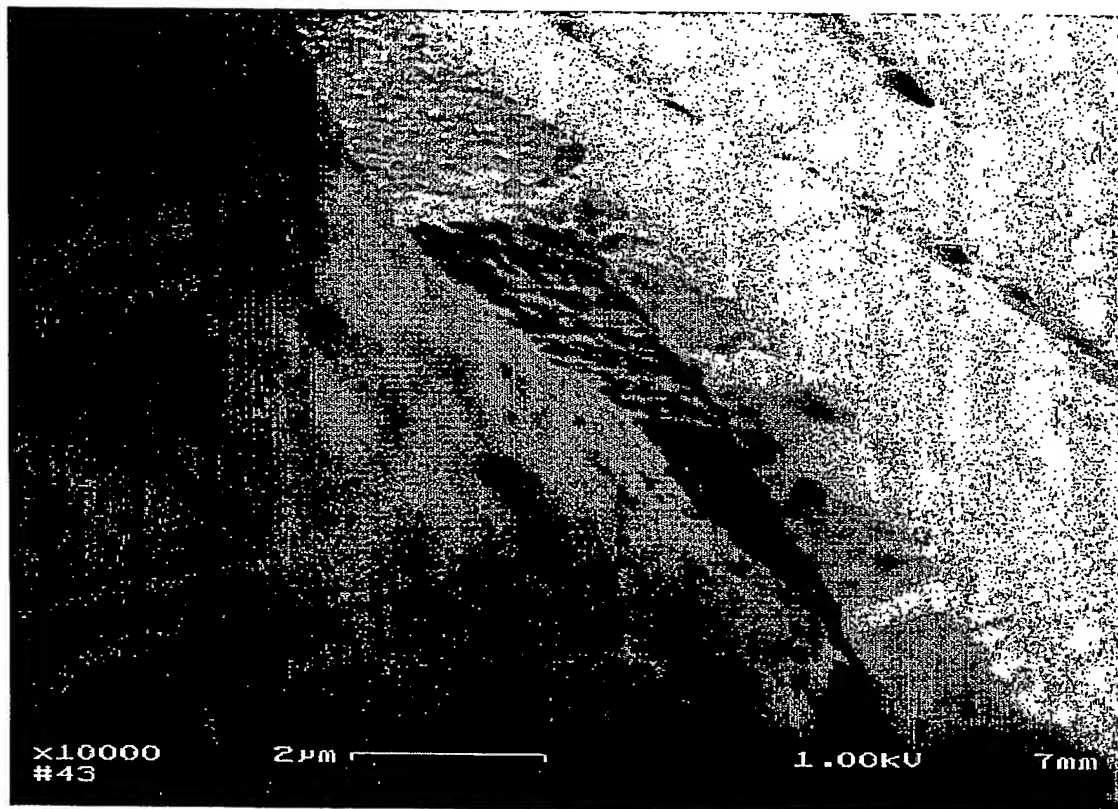


Figure 6

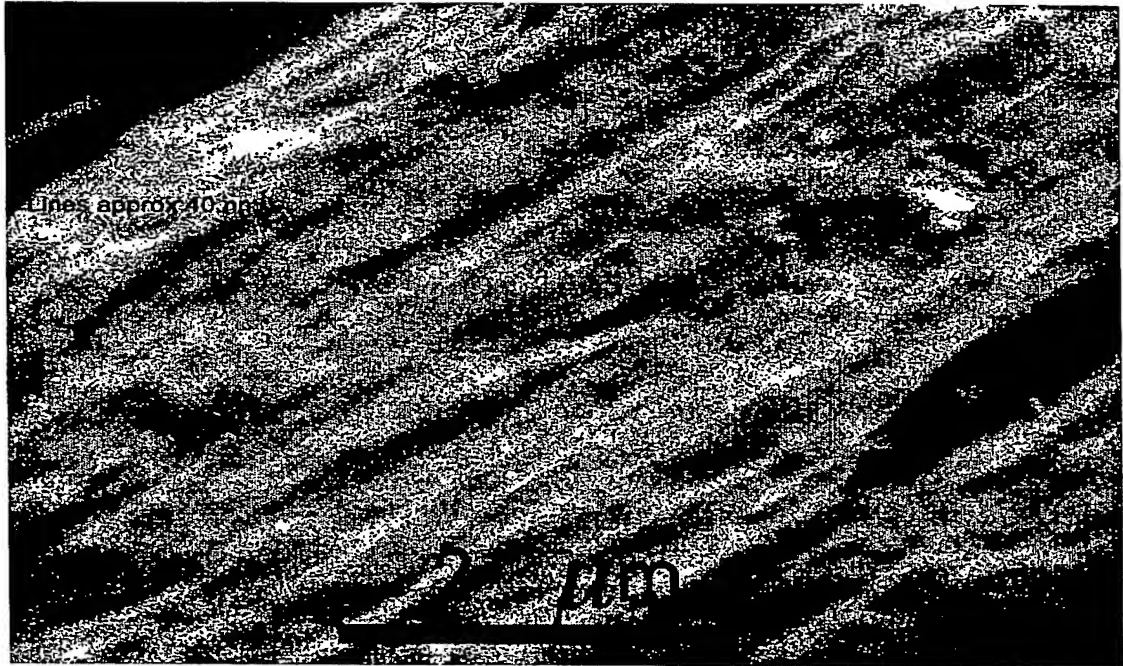




Figure 7

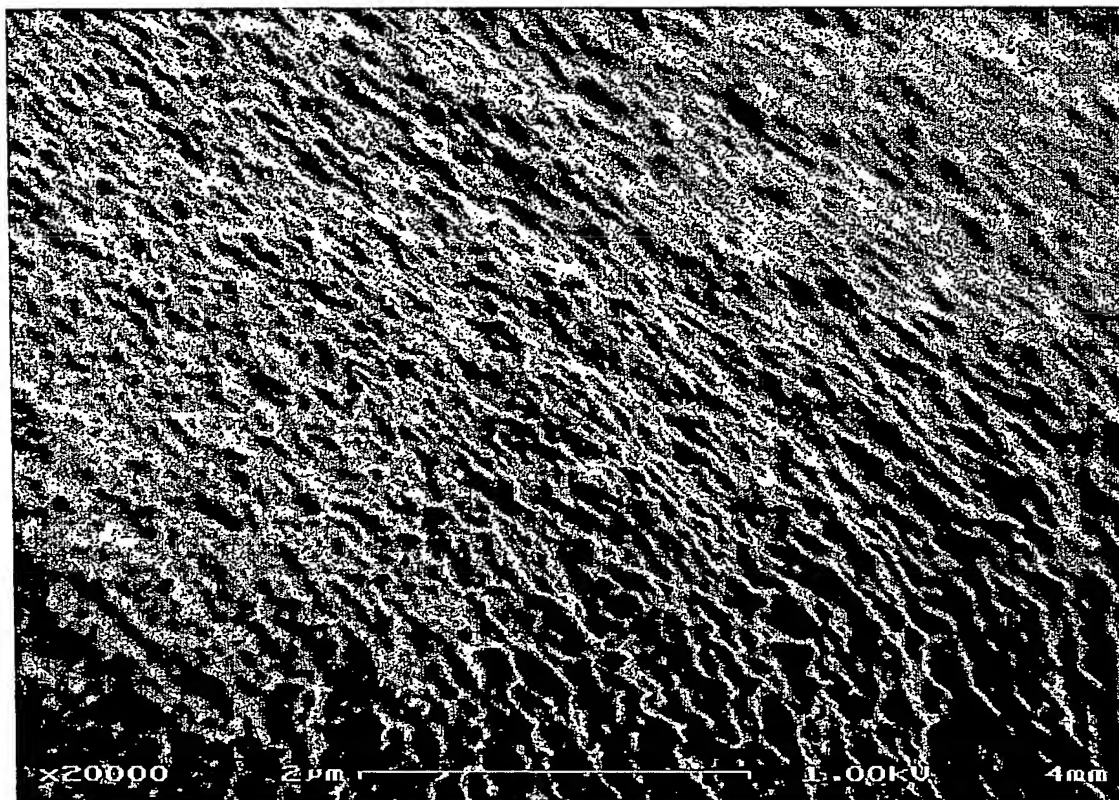
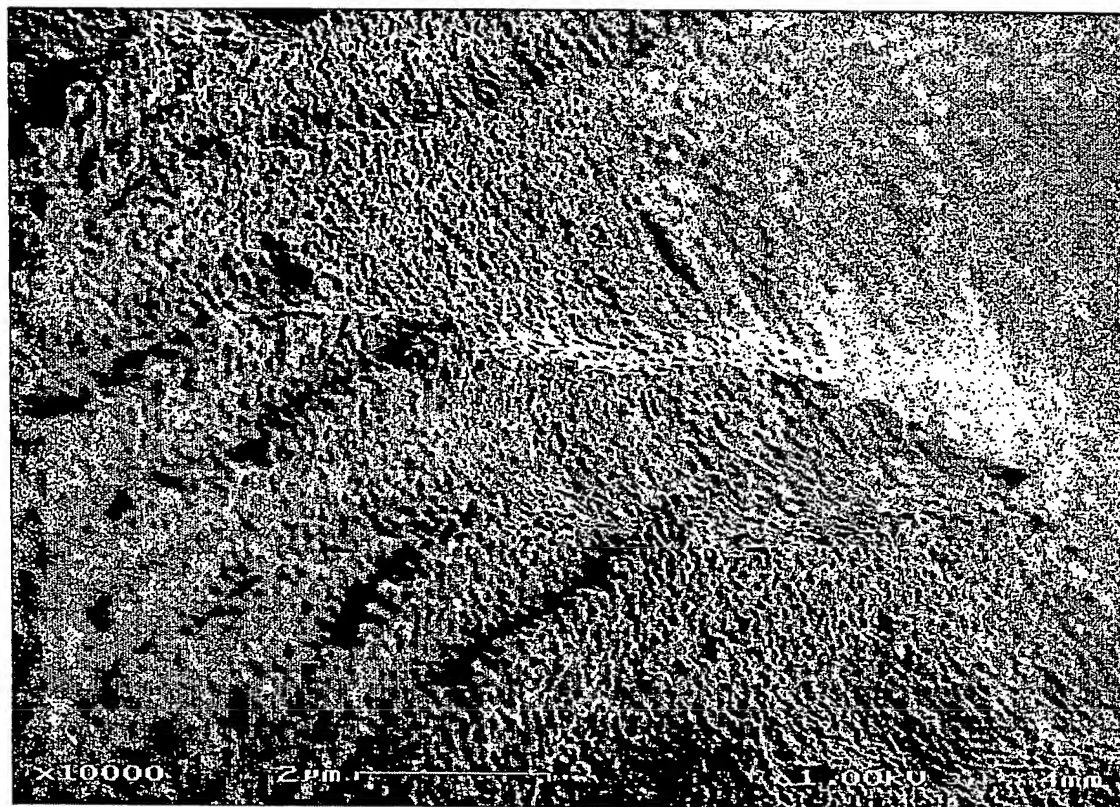


Figure 8





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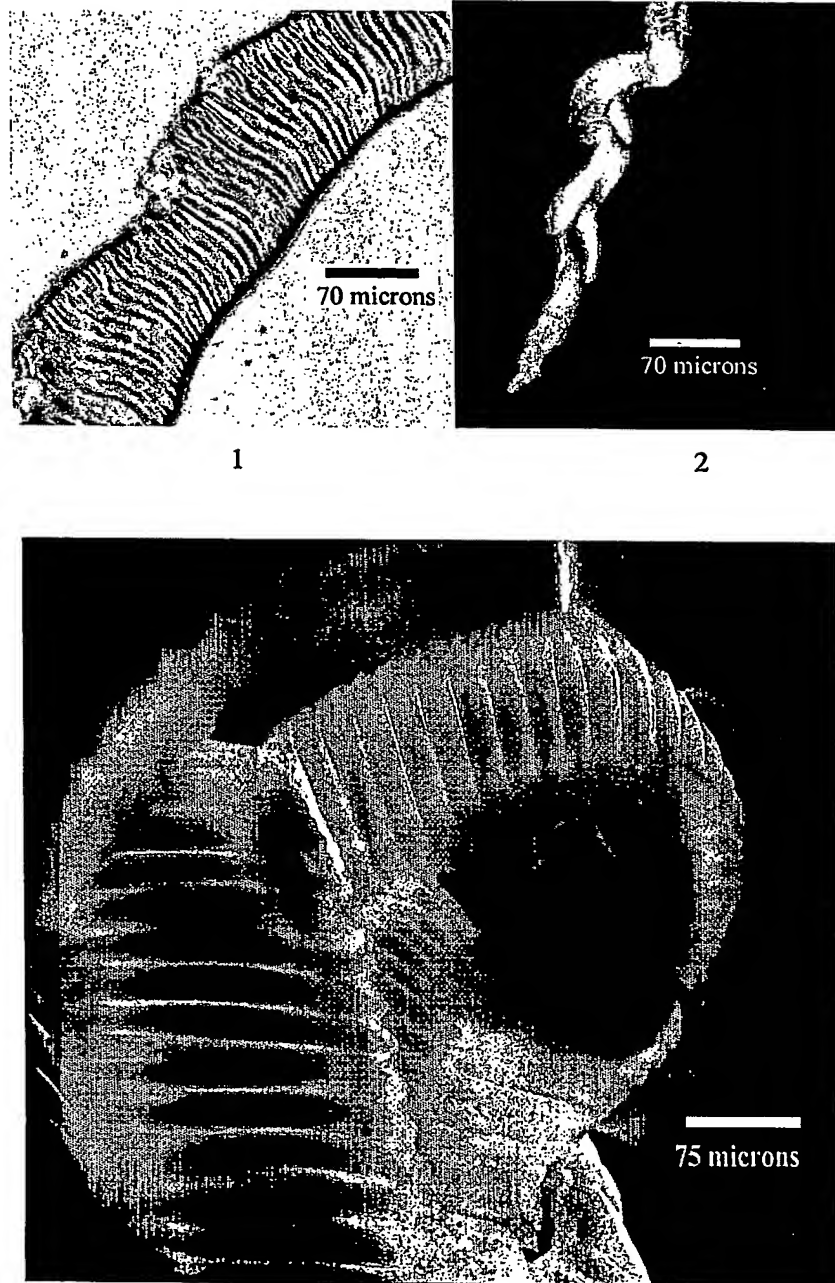
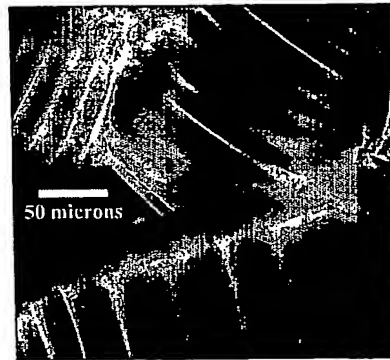
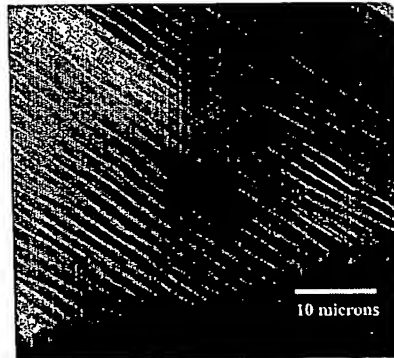
**Figure 9**

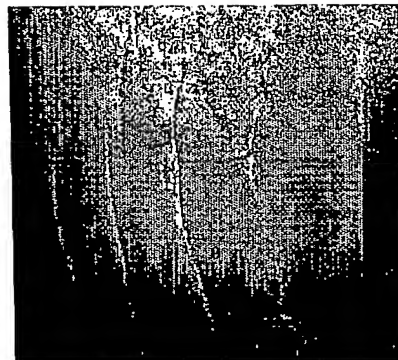
Figure 10



1



2



3

Figure 11

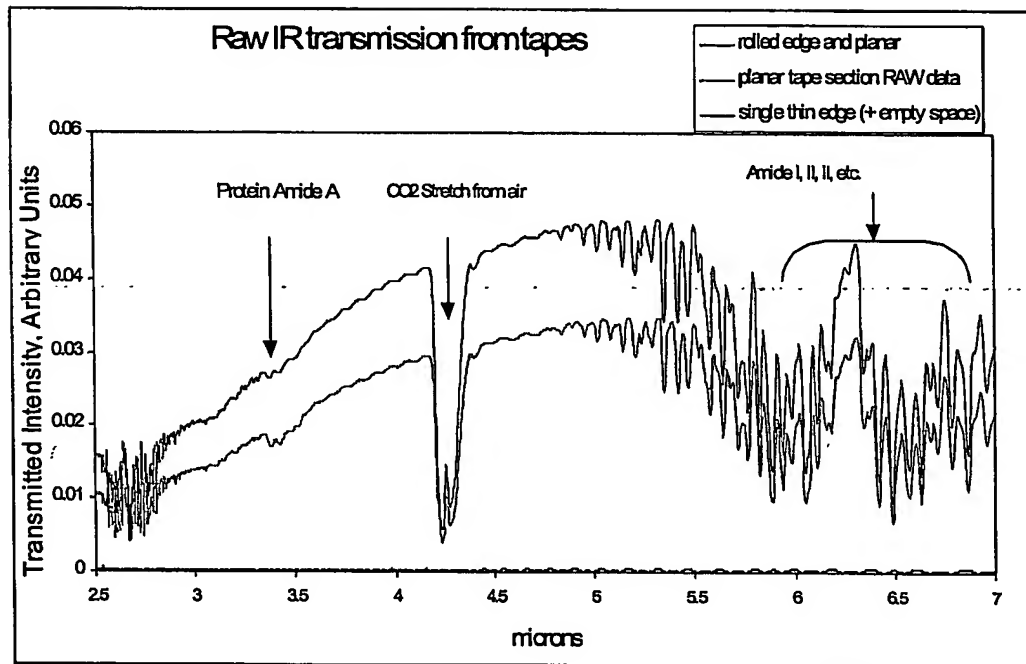
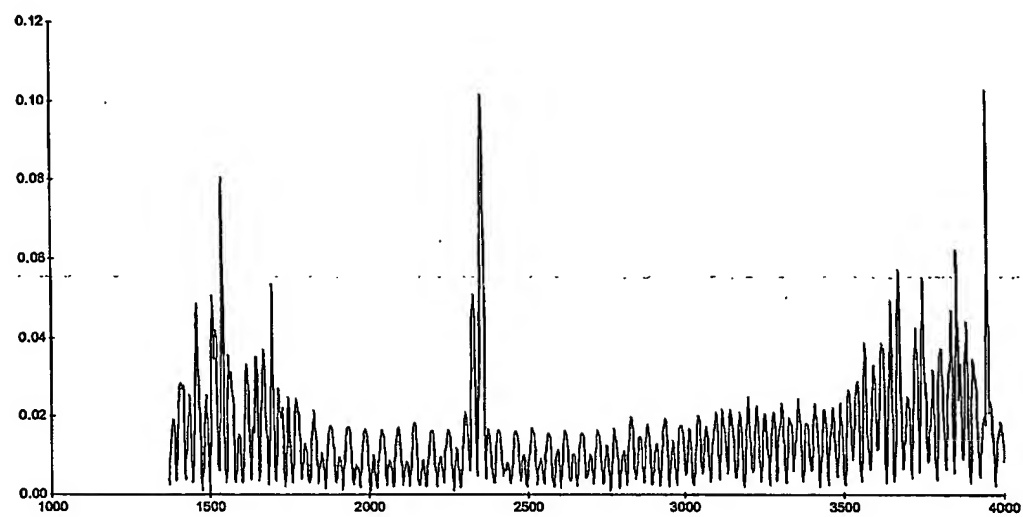


Figure 12



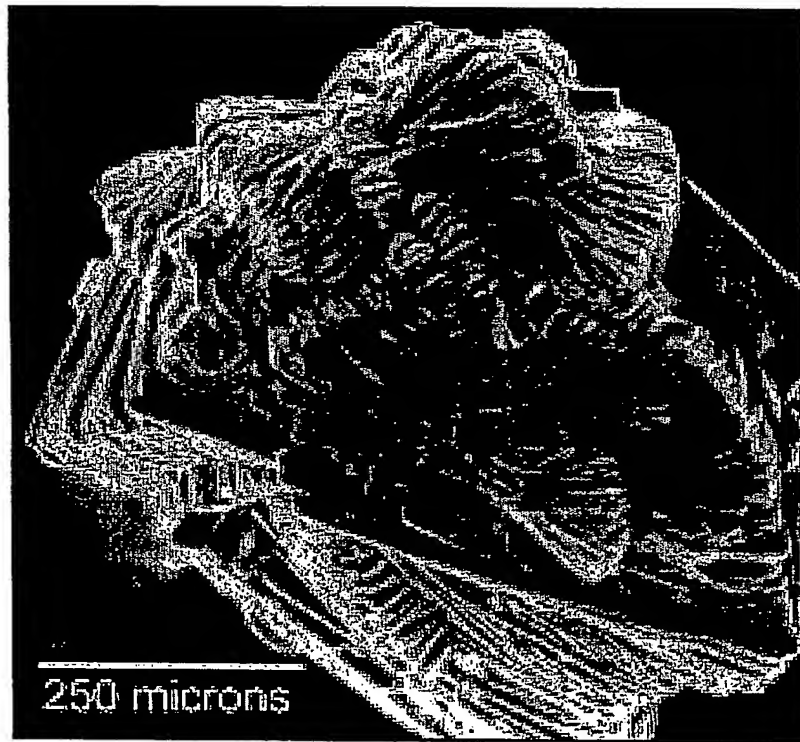
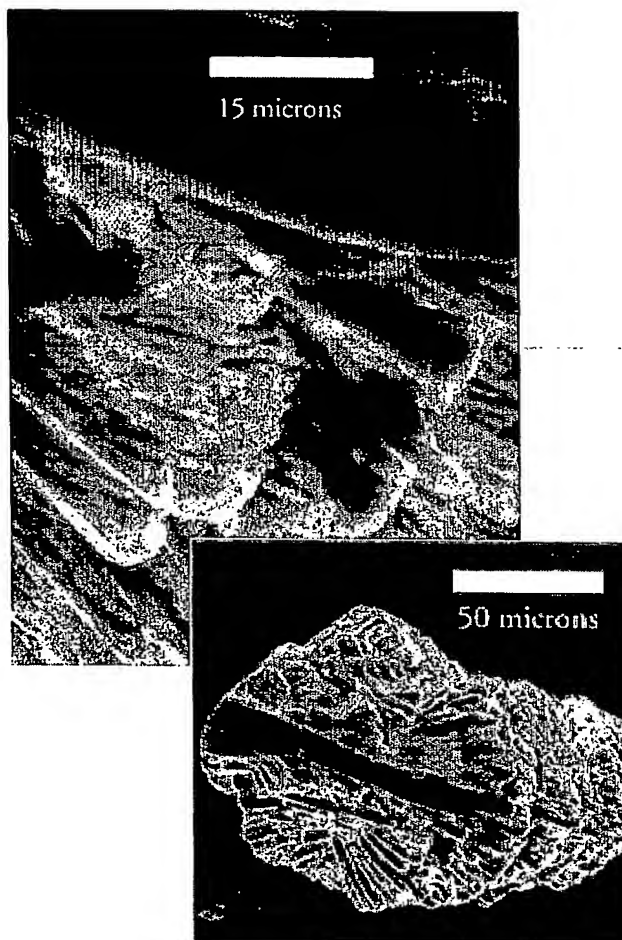
**Figure 13**

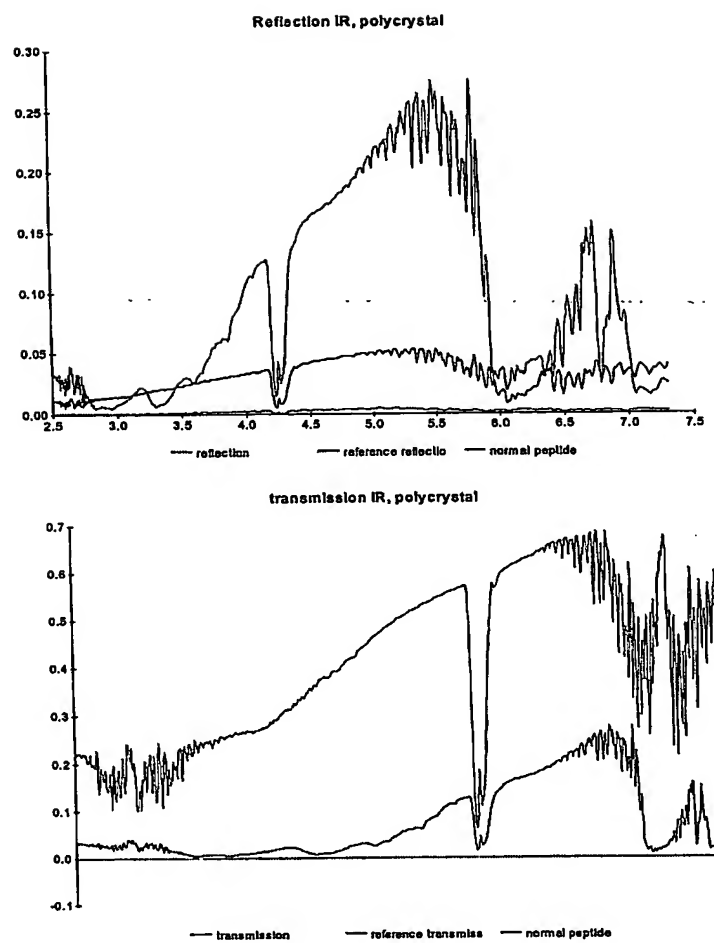
Figure 14





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Figure 15





**Figure 17**



**Figure 18**



**Figure 19**

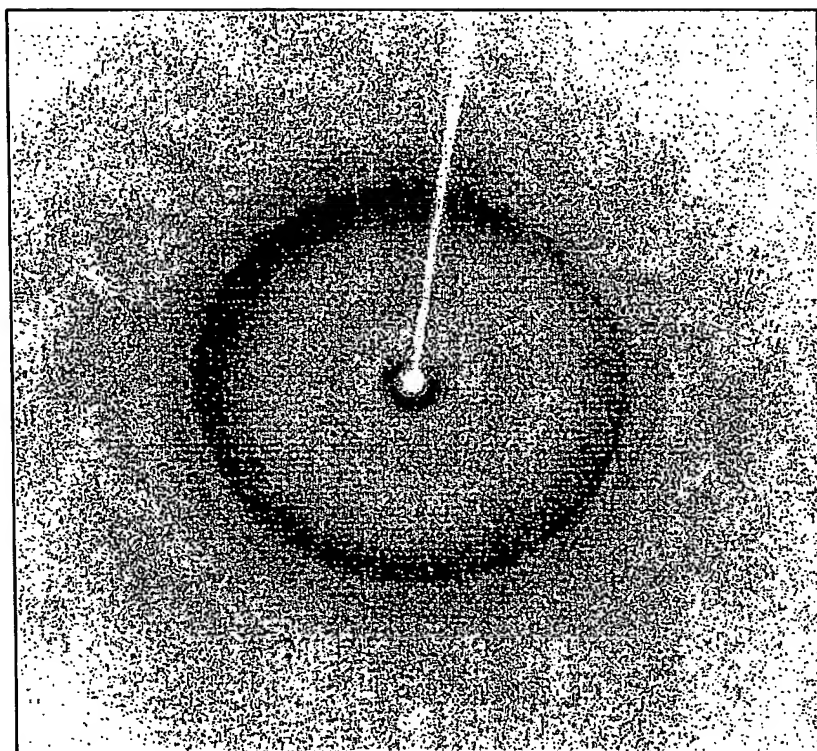
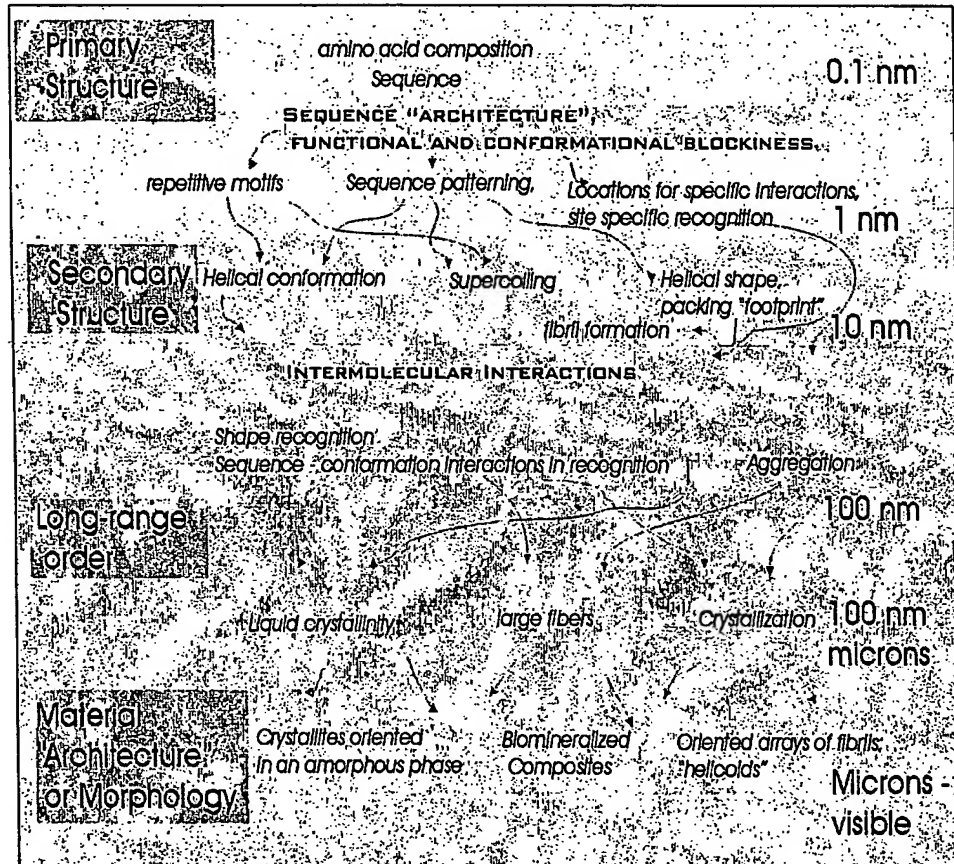


Figure 20



- Long homogeneous helical domains
- Not necessarily "folded"
- Polymorphic secondary structure
- Material formed by mesophase
- Structural role
- Extended fibers or fibrils
  - similar to synthetic polymers
  - can be polycrystalline, mineralized



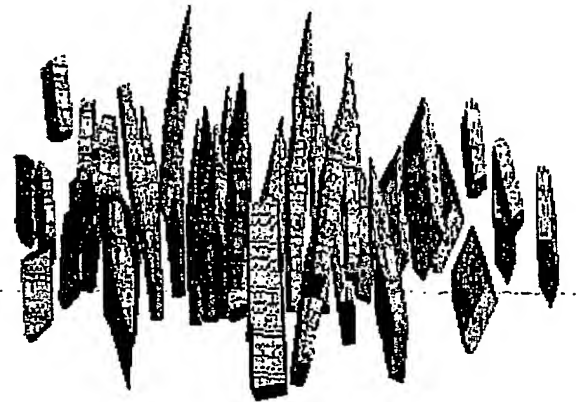
**Figure 21**

•“Liquid Crystal”

—Molecules anisotropic

—orientation, possibly some position

Chiral one dimensional liquid crystal



Two dimensional liquid crystals

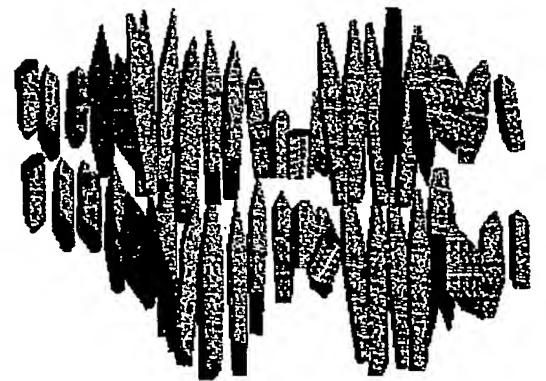
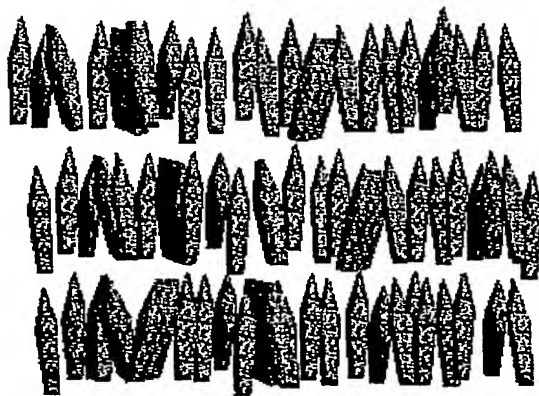
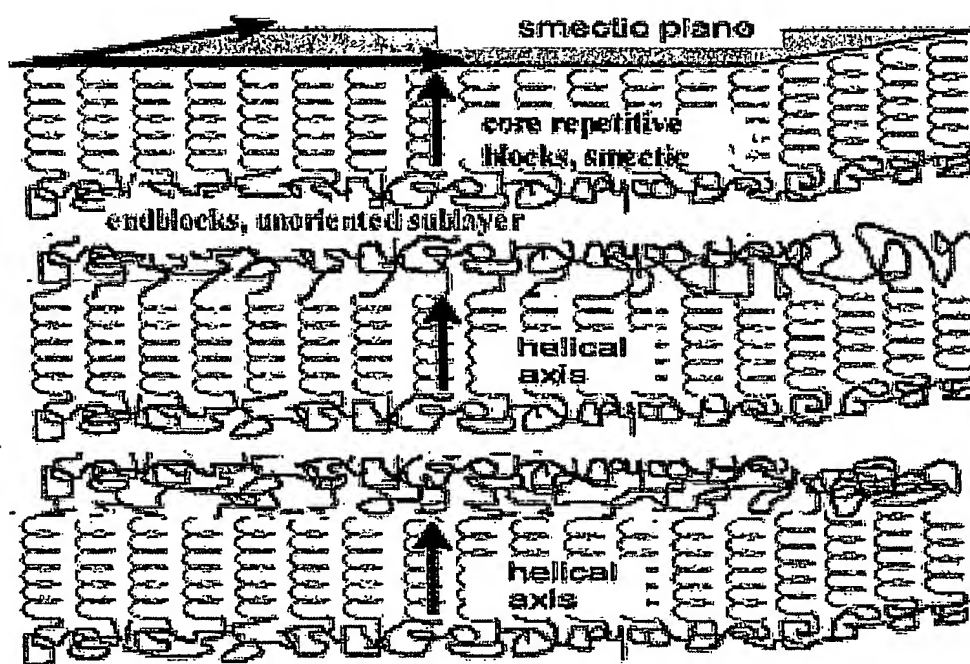
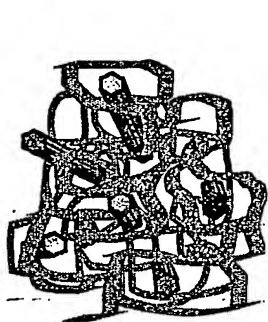
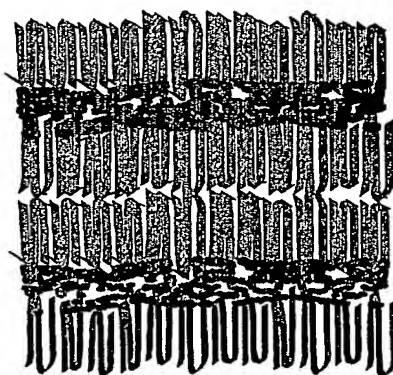


Figure 22

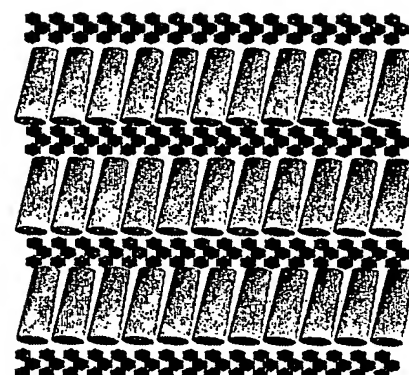


**Figure 23**

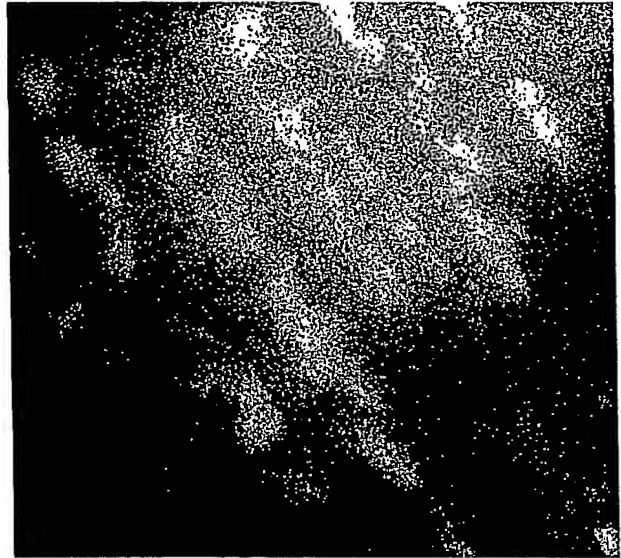
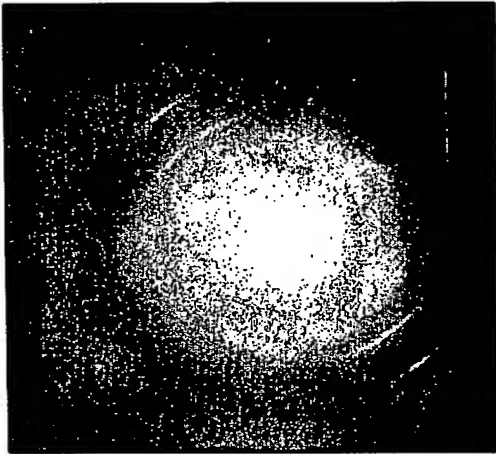
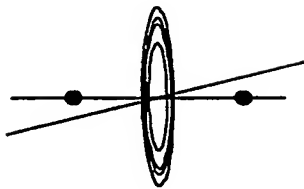
1. Nanocomposite - nanodomains of one phase separated by nanoscale domains of a second phase



2. Simple Patterned Nanocomposite (from smectic layers)



3. "Cocrystal" - peptide phase crystallizes and/or inorganic phase crystallizes within layers

**Figure 24****Silkworm****Reciprocal Lattice for  
Cholesteric Film****Cholesteric  
Diffraction  
Pattern  
Expected**

**Figure 25**

Peptide (GAGAGS) core

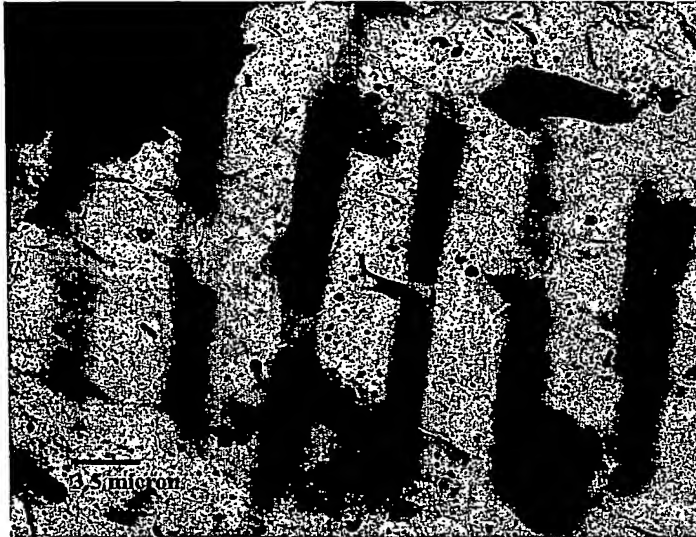


Met triggered Spider silk (biosynthetic)



**Figure 26**

Peptides



Native Proteins (silks)

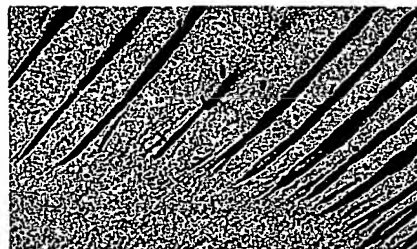
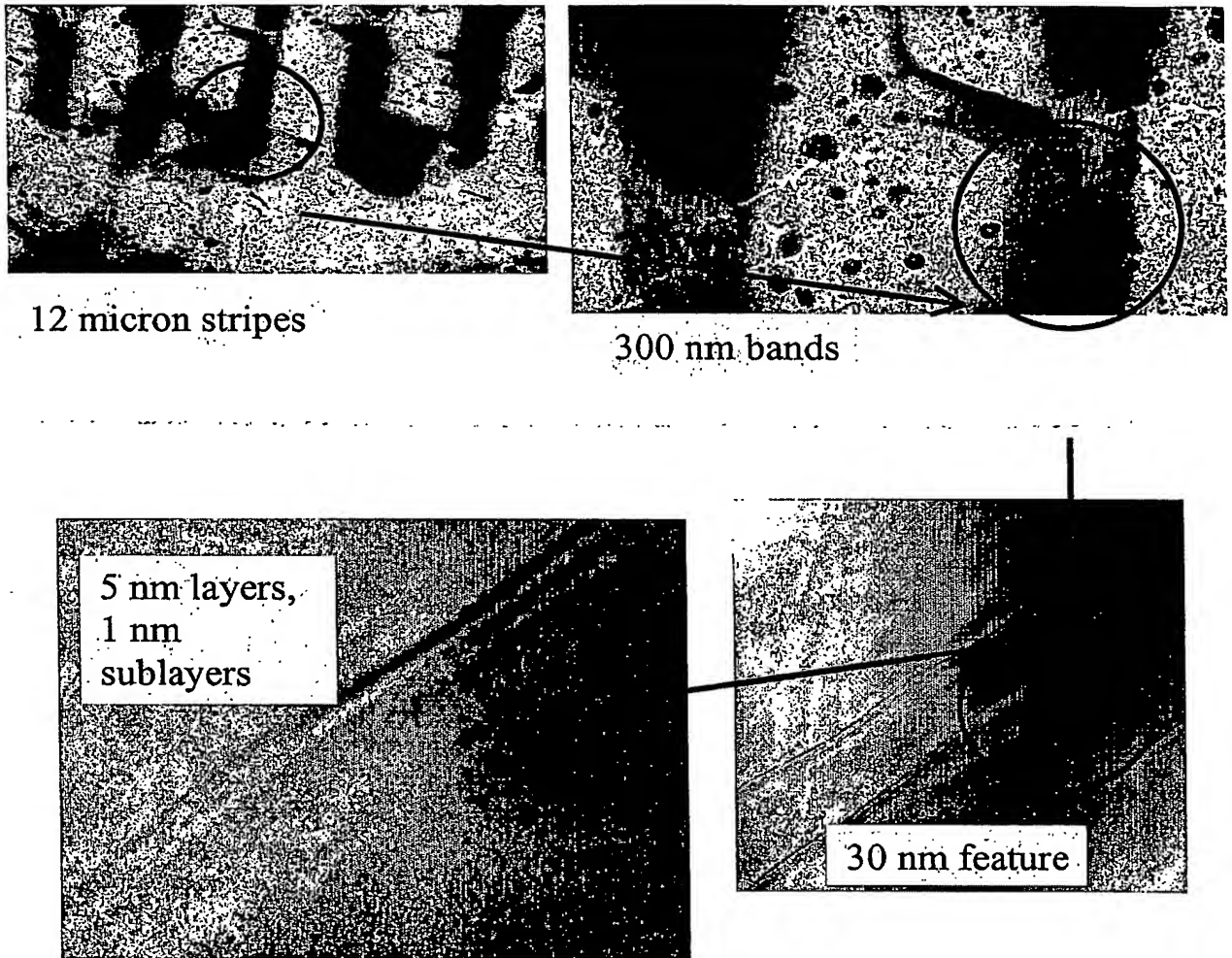




Figure 27



Air water interface from  
EDTA-Na aqueous solution of  
(Glu)<sub>5</sub>(Gly-Asp-Val-Gly-Gly-  
Ala-Gly-Ala-Thr-Gly-Gly-  
Ser)<sub>2</sub>(Glu)<sub>5</sub>

Figure 28

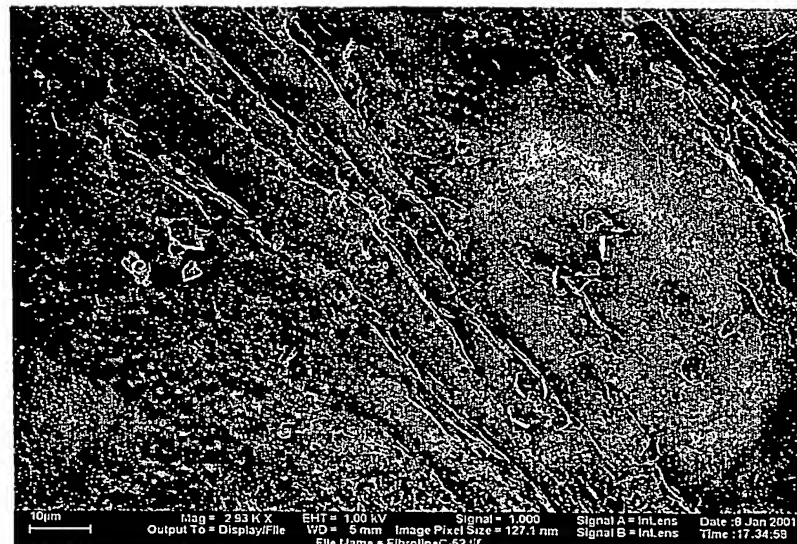
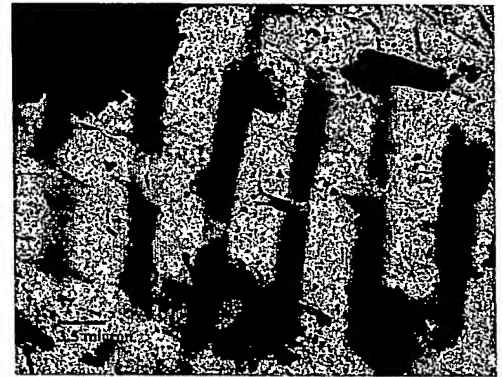
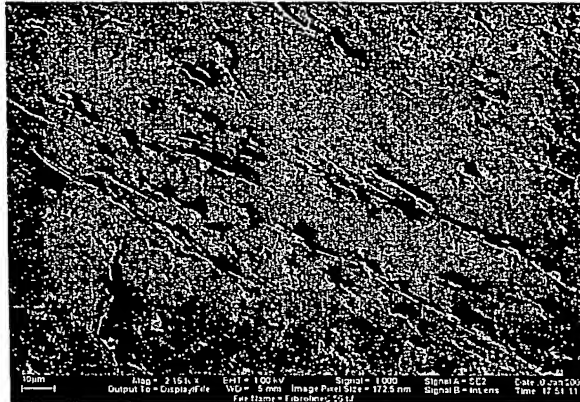
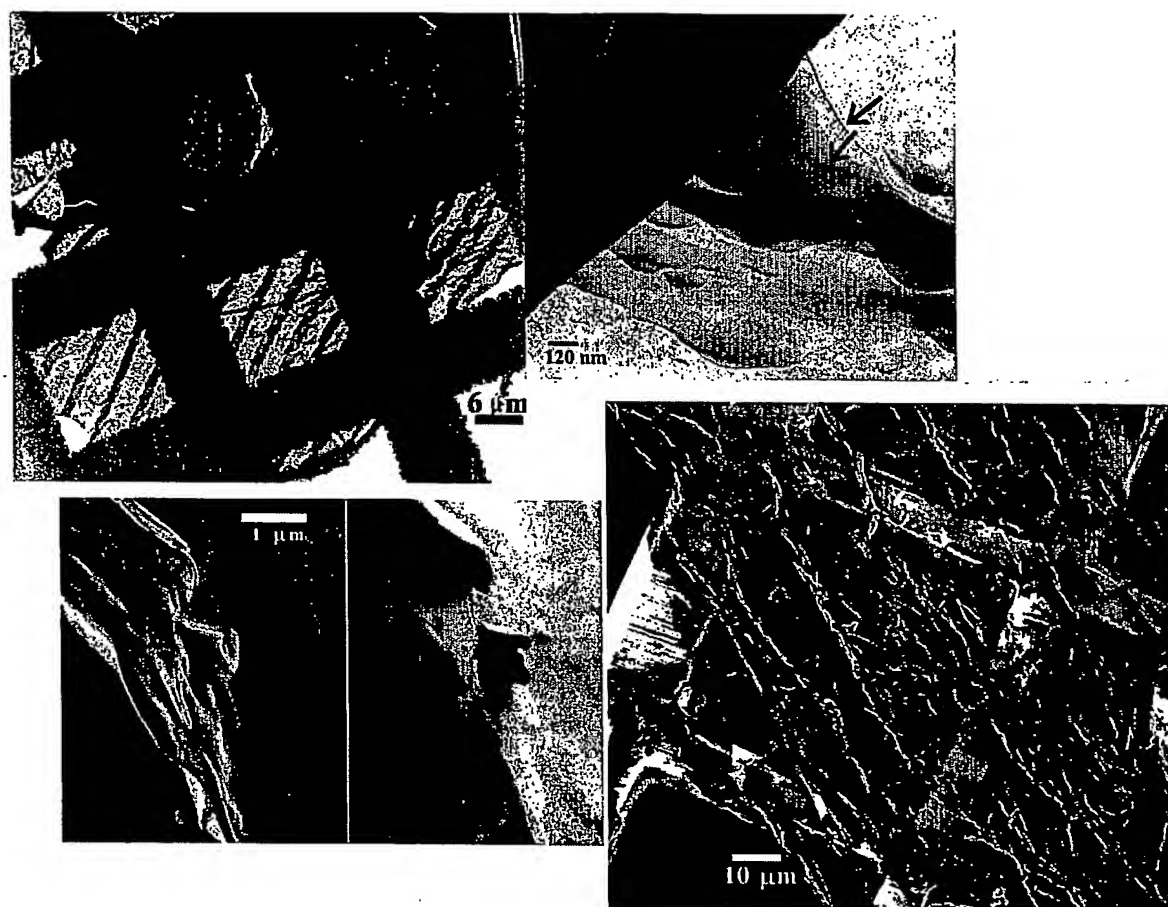
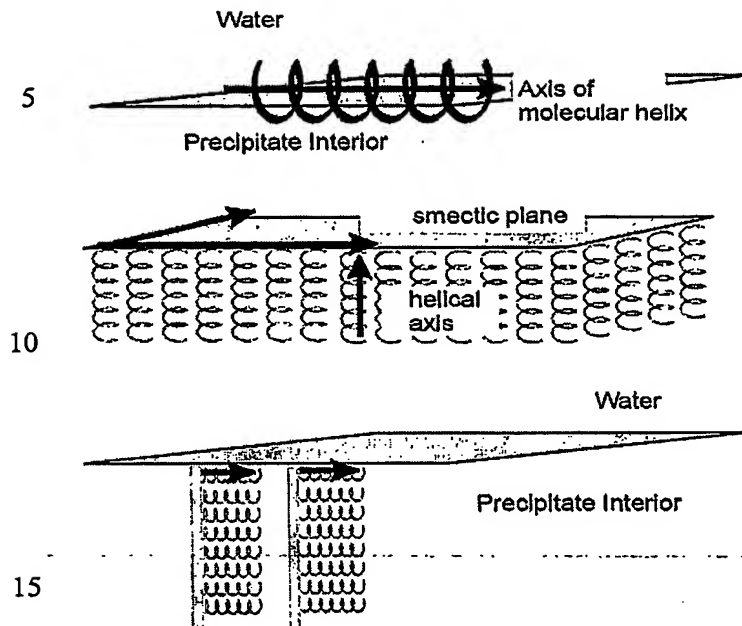


Figure 29



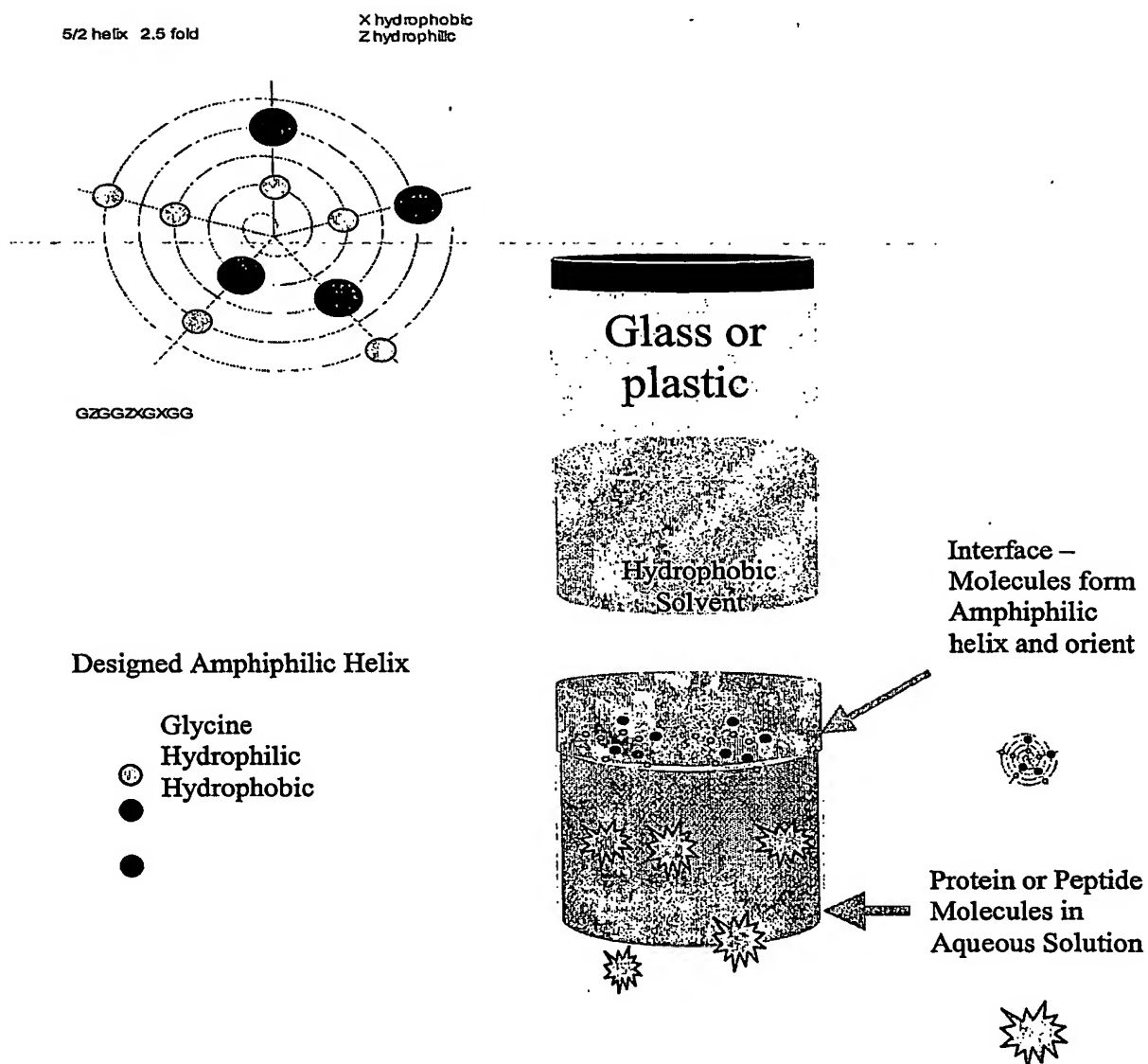
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Figure 30

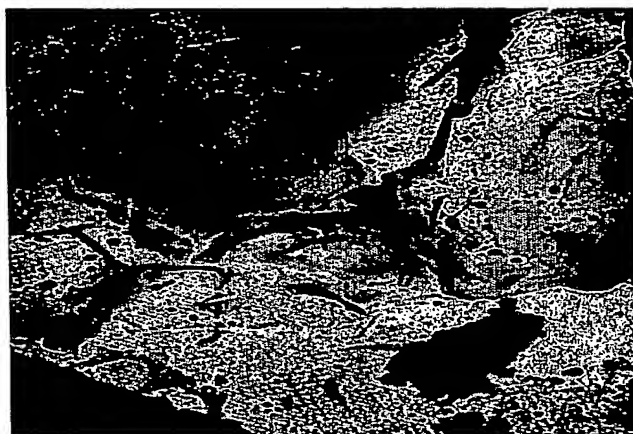
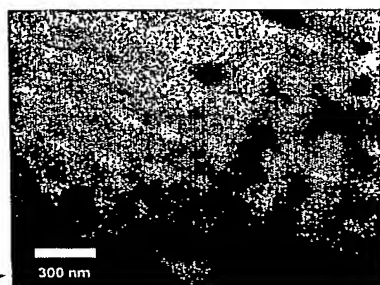


- A designed helix with a stronger hydrophobic/hydrophilic difference will be more readily stabilized and anchored parallel to the interface
- Helical axis is perpendicular to smectic layer plane
- Helices which tend to be parallel to interface and film result in layers more often normal to film

Figure 31

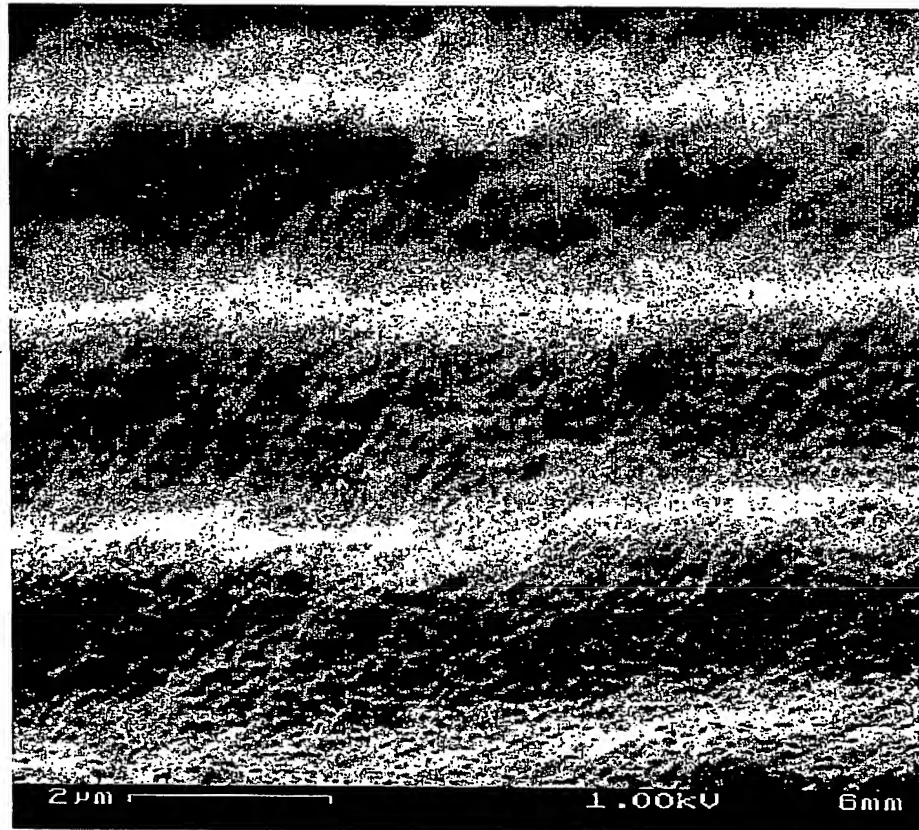


**Figure 32**





**Figure 33**



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